DOCUMENT RESUME

ED 422 850 IR 018 991

AUTHOR	Daughton, William J.
TITLE	A Method for Teaching Integrated Product Team Concepts to Remote Students.
PUB DATE	1998-00-00
NOTE	5p.; In: Distance Learning '98. Proceedings of the Annual Conference on Distance Teaching & Learning (14th, Madison, WI, August 5-7, 1998); see IR 018 976.
PUB TYPE	Reports - Descriptive (141) -- Speeches/Meeting Papers (150)
EDRS PRICE	MF01/PC01 Plus Postage.
DESCRIPTORS	Awards; Business Administration; *Cooperative Learning; Course Evaluation; Distance Education; Electronic Mail; *Engineering Education; Evaluation Criteria; Graduate Study; Higher Education; *Institutional Evaluation; Introductory Courses; Student Attitudes; *Student Projects; Teaching Methods; *Teamwork
IDENTIFIERS	*Malcolm Baldrige National Quality Award; *Product Development; University of Colorado Boulder

ABSTRACT

The graduate program in Engineering Management at the University of Colorado at Boulder offers a Master in Engineering for working, professional engineers preparing for early management positions. The program is offered to traditional, on-campus students and to remote students through the Colorado Advanced Training in Engineering and Computer Science (CATECS) program. The experience of an integrated product team was added to the introductory course in the program. The class was divided into eight integrated product teams whose challenge was to develop a final product--a single, comprehensive assessment of the application of a fictitious company for the Malcolm Baldrige National Quality Award. Feedback was solicited from the students at three points during the semester. All of the responding students indicated no major difficulty in finding a team that matched their interest. During the course of the semester, students indicated that the majority of interaction among team members was via e-mail. At the end of the semester, 88% of the students felt that this project gave them a very good to excellent appreciation of how a company can be assessed using the Baldrige criteria, and all respondents indicated a good to very good appreciation of how an integrated product team works. (AEF)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)
This document has been reproduced as received from the person or organization originating it.
Minor changes have been made to improve reproduction quality.
Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

A Method for Teaching Integrated Product Team Concepts to Remote Students

Dr. William J. Daughton
Director of the Program in Engineering Management
University of Colorado at Boulder

PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY
C.H. Olgren
TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC).

ED 422 850

Introduction

The graduate program in Engineering Management in the College of Engineering and Applied Science at the University of Colorado at Boulder offers a Master in Engineering (M.E.) for working, professional engineers preparing for early management positions. The program is offered to traditional, on-campus students and to remote students through the Colorado Advanced Training in Engineering and Computer Science (CATECS) program. CATECS provides the studio-classrooms, broadcasts live televised courses to a number of company sites located along the Colorado Front Range, and produces videotapes for those students outside the broadcast area. The live television broadcasts are one-way video and two-way audio.

Each year, approximately 50 students are admitted to the program, and at any one time, approximately 130 students are active in the program. Students are required to have at least two years of professional work experience to be admitted to the program. About 90% of the students are at remote sites throughout the United States and around the world. There are some sites where several active students are clustered, but there are also many students who are isolated at a particular site.

Motivation for Teaching Integrated Product Team Concepts

Very large or complex development projects in industry often require that individual components of the project deliverable be developed separately and later integrated (Meredith and Mantel, 1995). Individual teams of engineers work on the development of the components and then integrate their contributions into a final product deliverable leading to the concept of an integrated product team. While individual components have sometimes been developed at different physical sites, this capability has recently been greatly facilitated by the incredible advances in communication technology ("Networks That Do New Tricks," 1998). Since many of the students in our graduate program are engineers working on development projects and programs, it is valuable to provide them with the experience of working on an integrated product team. Many of the companies where these students work have begun to strongly emphasize the use of globally dispersed teams for this purpose. As Knoll and Jarvenpaa (1995) suggest, global collaboration is becoming more the norm rather than the exception.

Integrated Product Team Methodology

The experience of an Integrated Product Team was added to the introductory course in the program: Introduction to Engineering Management, which is required of all students. Other types of team projects have been used in this course in the past. The way these teams were formed and how they functioned have been described previously (Daughton, 1996).

IR018991

Course Format

The format of this particular course lends itself quite nicely to an integrated product team experience. The course structure is built around the seven categories of the Malcolm Baldrige National Quality Award (National Institute of Standards and Technology, 1998). While there is no intent to teach the mechanics of application for this award, the seven categories provide a framework of management dimensions appropriate for such a course. The seven Baldrige categories are Leadership, Strategic Planning, Customer and Market Focus, Information and Analysis, Human Resource Focus, Process Management, and Business Results. The structure and format of the award criteria provide an excellent source of insight into the various aspects of these management dimensions. As a complement to the course, an application of these criteria to a fictitious company as a class project provides a more in depth understanding of the management dimensions imbedded in the Baldrige award structure. The assessment of a fictitious company application for the Baldrige Award by class teams forms the basis for the integrated project team experience.

Project Structure

The class was divided into eight integrated product teams whose challenge was to develop a final product, which in this case was a single, comprehensive assessment of the application of a fictitious company for the Baldrige Award. A fictitious company application was obtained as part of a case study packet for groups or individuals seeking to learn more about Baldrige assessment techniques (American Society for Quality, 1998). Each case study packet contains an application of a fictitious company for the Baldrige award and a scorebook. The scorebook has assessment sheets for each of the components of the seven categories and a summary assessment worksheet so that the case study application can be fully assessed and scored against the Baldrige criteria. The eight teams of students were formed to work on the assessment against the criteria in each of the seven categories and to develop the summary assessment. Each of the seven category teams worked exclusively on their assigned category and then worked with the eighth team to develop an integrated company assessment. This was particularly challenging since the criteria in each category have some overlapping and complementary features with the other categories resulting in a need for collaboration between the teams to ensure a consistent, integrated assessment. The class project extended through the entire semester providing plenty of time for team formation and the completion of the assessment.

Team Composition

The students were allowed to divide themselves among the eight teams primarily based on individual interests in the different Baldrige categories. Every team was required to have at least one member that was not co-located with other team members to provide experience in distance teaming. To facilitate organizing the teams, all the students were required to subscribe to an Internet class list that provided asynchronous email communication through posting of messages to all subscribed list members. There were typically 5–8 students on each of the teams.

Lessons Learned

Feedback was solicited from students at three points during the semester. Students were sent a short questionnaire via the Internet class list as the teams were being formed, while the assessments were being done, and when the project was completed. The information from these questionnaires along with the evaluation of the final, comprehensive assessment provided a basis for analyzing the value of this learning experience.

All of the responding students indicated that they had no major difficulty in finding a Baldrige category team that matched their interest. Only 11% of the respondents rated the Internet class list as ineffective in helping find a team. By this was meant that the large majority of students felt this vehicle enabled remote students to identify other students with similar interests in certain Baldrige categories and organize a team based on that interest. In fact, the teams were entirely organized by the students themselves with no intervention by the instructor. Several remote students did comment that connecting with other students would have been less traumatic if pictures or biographies of all students would have been available at the beginning of the semester.

During the course of the semester, responding students indicated that the vast majority of interaction among team members was via email. The same was true for interaction between the various teams. Most respondents felt that poor email skills and habits were the major barrier to effective inter-team and intra-team communication. Many expressed a desire to have more face-to-face interactions through videoconference technology. As would be expected, most of the inter-team communication was between the seven category teams and the summary team providing inputs to the summary team or seeking clarification on issues such as format, deadlines, and content integration.

At the end of the semester, 88% of the responding students felt that this project gave them a very good to excellent appreciation of how a company can be assessed using the Baldrige criteria. All respondents indicated a good to very good appreciation of how an integrated product team works. The survey results show that 87% of the students indicated little to no trouble working together with other members of their team, and 62% indicated little to average trouble in coordinating inputs with other teams. Finally, 78% of the respondents felt that this project was a useful complement to the course.

In comparing the submitted final integrated assessment against the scoring key provided with the case study packet, the instructor found very good correlation. The overall assessment score submitted with the class project assessment fell within the solution assessment range given in the scoring key. The comments and observations developed by the students in each of the categories portrayed a consistent picture of the strengths and weaknesses of the fictitious company and were in good agreement with the scoring key.

Summary

This class exercise demonstrates the viability of simulating integrated product team projects using teams of remote students working on a single class project. With the emergence of integrated product teams, many of them globally distributed, it is important that graduate students in technical management gain some experience in this area. The issues and problems reported by students in this exercise are similar to those that many managers in

globally dispersed companies now face in organizing and running these teams. The logistics of organizing the individual teams is somewhat cumbersome with students widely distributed and not knowing each other very well when the semester begins. It is recommended that some effort be made to create a vehicle for student introductions such as an Internet class list. From the comments provided during the semester, one clear barrier to success is the degree of discipline students exercise in handling and responding to emails. With this being a primary form of communication, providing some email guidelines for students to follow would be prudent. Overall, it can be said that remote students can effectively collaborate on team projects even one as sophisticated as an integrated product team exercise.

References

American Society for Quality. (1998). *Business Case Study Packet.* [Brochure].

Daughton, W. J. (1996, August). Fostering Team Learning Experiences for Remote Students. *Proceedings of the 12th Annual Conference on Distance Teaching and Learning* (pp. 81–86). Madison: University of Wisconsin.

Knoll, K. & Jarvenpaa, S. L. (1995, January). Learning to Work in Distributed Global Teams. *Proceedings of Hawaii International Conference,* Vol. 4, 3–6, pp. 92–101.

Meredith, J. R. & Mantel, S. J. (1995). Project Management in Practice, Boeing's Key to Future Project Management Success—Multidiscipline Teams. In *Project Management, A Managerial Approach* (pp. 680–681). New York: John Wiley & Sons.

National Institute of Standards and Technology, United States Department of Commerce, Technology Administration. (1998). *Malcolm Baldrige National Quality Award, 1998, Criteria for Performance Excellence.*

Networks That Do New Tricks. (1998, April 6). *Business Week,* 100.

Autobiographical Sketch

William J. Daughton is a professor of Engineering Management and director of the Engineering Management Program at the University of Colorado at Boulder. He has over 15 years of middle and senior management experience in high technology industry at Texas Instruments, NCR, and AT&T as well as significant college teaching experience in science, engineering; and engineering management. He holds a Ph.D. in solid state physics from the University of Missouri at Columbia.

Address: Campus Box 435
University of Colorado
Boulder, CO 80309
Email: william.daughton@colorado.edu
Phone: (303) 492-3076
Fax: (303) 492-1443